IN THE TITLE

Please amend the title as follows:

~~STRUCTURE AND METHOD FOR IMPROVED SIGNAL PROCESSING~~

METHOD OF FABRICATING A TRANSISTOR ON A SUBSTRATE TO OPERATE AS A FULLY DEPLETED STRUCTURE

IN THE SPECIFICATION

Please amend the paragraph beginning at page 3, line 15:

The above-mentioned problems with integrated circuits and other problems are addressed by the present invention and will be understood by reading and studying the following specification. A structure and method which offer improved functionality are provided. In an embodiment, a method includes fabricating a transistor on a substrate including vertically forming a body region to operate as a fully depleted structure.

Please delete the paragraphs beginning at page 3, line 19 through page 5, line 21:

~~In particular, an illustrative embodiment of the present invention includes a mixer circuit. The mixer circuit has a transistor extending outwardly from a semiconductor substrate. The transistor has a first source/drain region, a body region, and a second source/drain region. The body region has opposing sidewall surfaces. And, the body region is formed of a fully depleted structure. A first gate is located on a first one of the opposing sidewall surfaces. A second gate is located on a second one of the opposing sidewall surfaces. Further, a local oscillator is coupled to the first gate, and a signal input is coupled to the second gate.~~

~~In another embodiment of the present invention, an analog circuit is provided. The analog circuit includes a dual-gated metal-oxide semiconducting field effect transistor (MOSFET) which extends outwardly from a semiconductor substrate. The dual-gated MOSFET has a first and a second source/drain region. The dual-gated MOSFET has a body region which includes opposing sidewall surfaces. The body region is formed of a fully depleted structure. A first gate is located on a first one of the opposing sidewall surfaces. A second gate located on a second one of the opposing sidewall surfaces. Further, a local oscillator can be coupled to the first gate to receive signals from a local oscillator signal and an analog signal input can be coupled to the second gate and provides an input signal to the second gate.~~

~~In another embodiment of the present invention, a signal processing integrated circuit is provided which includes both analog and digital circuits. The analog circuit includes a dual-~~

~~gated metal-oxide semiconducting field effect transistor (MOSFET) which extends outwardly from a semiconductor substrate. The dual-gated MOSFET has a first and a second source/drain region. The dual-gated MOSFET has a body region which includes opposing sidewall surfaces. The body region is formed of a fully depleted structure. A first gate is located on a first one of the opposing sidewall surfaces. A second gate is located on a second one of the opposing sidewall surfaces. Further, a local oscillator can be coupled to the first gate to receive signals from a local oscillator signal and an analog signal input can be coupled to the second gate and provides an input signal to the second gate.~~

~~In another embodiment of the present invention, a communication device is provided. The communication device includes a signal processing circuit. The signal processing circuit has a dual-gated metal-oxide semiconducting field effect transistor (MOSFET) which extends outwardly from a semiconductor substrate. The dual-gated MOSFET includes a first and a second source/drain region. The dual-gated MOSFET has a body region which has opposing sidewall surfaces. The body region is formed of a fully depleted structure. A first gate is located on a first one of the opposing sidewall surfaces. A second gate is located on a second one of the opposing sidewall surfaces. Further, a local oscillator is coupled to the first gate and provides a local oscillator signal to the first gate. A signal input is coupled to the second gate and provides an input signal to the second gate. The communication device also includes a receiver and a transmitter which are electrically coupled to the signal processing circuit for receiving and transmitting signals.~~

~~Yet another embodiment of the present invention includes a method of signal processing. The method includes biasing a first gate of a dual-gated MOSFET. The dual-gated MOSFET has a first and a second source/drain region. The dual-gated MOSFET has a body region which has opposing sidewall surfaces. The body region is formed from a fully depleted structure. The first gate opposes a first one of the opposing sidewall surfaces. A second gate of the dual-gated MOSFET is similarly biased. The second gate opposes a second one of the opposing sidewall surfaces. The method further includes a local oscillator signal to the first gate and applying an input signal to the second gate.~~

~~Thus, an improved structure and method are provided for signal processing. The structure includes a dual-gated metal-oxide semiconducting field-effect transistor (MOSFET). The dual-gated MOSFET can be fabricated according to current CMOS processing techniques. The body region of the dual-gated MOSFET is a fully depleted structure. The structure includes two gates which are positioned on opposite sides of the opposing sides of the body region. Further, the structure operates as one device where the threshold voltage of one gate depends on the bias of the other gate. Thus, the structure yields a small signal component in analog circuit applications which depends on the product of the signals applied to the gates, and not simply one which depends on the sum of the two signals.~~

Please insert the following paragraphs before the paragraph beginning at page 7, line 18:

In particular, an illustrative embodiment of the present invention includes a mixer circuit. The mixer circuit has a transistor extending outwardly from a semiconductor substrate. The transistor has a first source/drain region, a body region, and a second source/drain region. The body region has opposing sidewall surfaces. And, the body region is formed of a fully depleted structure. A first gate is located on a first one of the opposing sidewall surfaces. A second gate is located on a second one of the opposing sidewall surfaces. Further, a local oscillator is coupled to the first gate, and a signal input is coupled to the second gate.

In another embodiment of the present invention, an analog circuit is provided. The analog circuit includes a dual-gated metal-oxide semiconducting field effect transistor (MOSFET) which extends outwardly from a semiconductor substrate. The dual-gated MOSFET has a first and a second source/drain region. The dual-gated MOSFET has a body region which includes opposing sidewall surfaces. The body region is formed of a fully depleted structure. A first gate is located on a first one of the opposing sidewall surfaces. A second gate located on a second one of the opposing sidewall surfaces. Further, a local oscillator can be coupled to the first gate to receive signals from a local oscillator signal and an analog signal input can be coupled to the second gate and provides an input signal to the second gate.

In another embodiment of the present invention, a signal processing integrated circuit is provided which includes both analog and digital circuits. The analog circuit includes a dual-gated metal-oxide semiconducting field effect transistor (MOSFET) which extends outwardly from a semiconductor substrate. The dual-gated MOSFET has a first and a second source/drain region. The dual-gated MOSFET has a body region which includes opposing sidewall surfaces. The body region is formed of a fully depleted structure. A first gate is located on a first one of the opposing sidewall surfaces. A second gate is located on a second one of the opposing sidewall surfaces. Further, a local oscillator can be coupled to the first gate to receive signals from a local oscillator signal and an analog signal input can be coupled to the second gate and provides an input signal to the second gate.

In another embodiment of the present invention, a communication device is provided. The communication device includes a signal processing circuit. The signal processing circuit has a dual-gated metal-oxide semiconducting field effect transistor (MOSFET) which extends outwardly from a semiconductor substrate. The dual-gated MOSFET includes a first and a second source/drain region. The dual-gated MOSFET has a body region which has opposing sidewall surfaces. The body region is formed of a fully depleted structure. A first gate is located on a first one of the opposing sidewall surfaces. A second gate is located on a second one of the opposing sidewall surfaces. Further, a local oscillator is coupled to the first gate and provides a local oscillator signal to the first gate. A signal input is coupled to the second gate and provides an input signal to the second gate. The communication device also includes a receiver and a transmitter which are electrically coupled to the signal processing circuit for receiving and transmitting signals.

Yet another embodiment of the present invention includes a method of signal processing. The method includes biasing a first gate of a dual-gated MOSFET. The dual-gated MOSFET has a first and a second source/drain region. The dual-gated MOSFET has a body region which has opposing sidewall surfaces. The body region is formed from a fully depleted structure. The first gate opposes a first one of the opposing sidewall surfaces. A second gate of the dual-gated MOSFET is similarly biased. The second gate opposes a second one of the opposing sidewall

surfaces. The method further includes a local oscillator signal to the first gate and applying an input signal to the second gate.

Thus, an improved structure and method are provided for signal processing. The structure includes a dual-gated metal-oxide semiconducting field effect transistor (MOSFET). The dual-gated MOSFET can be fabricated according to current CMOS processing techniques. The body region of the dual-gated MOSFET is a fully depleted structure. The structure includes two gates which are positioned on opposite sides of the opposing sides of the body region. Further, the structure operates as one device where the threshold voltage of one gate depends on the bias of the other gate. Thus, the structure yields a small signal component in analog circuit applications which depends on the product of the signals applied to the gates, and not simply one which depends on the sum of the two signals.